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RECORDS OF TWO PEST SPECIES, *LEPTOGLOSSUS ZONATUS* (HETEROPTERA: COREIDAE) AND *PACHYCORIS KLUGII* (HETEROPTERA: SCUTELLERIDAE), FEEDING ON THE PHYSIC NUT, *JATROPHA CURCAS*, IN MEXICO

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The physic nut, *Jatropha curcas* L. (Malpighiales: Euphorbiaceae), is one of 75 plant species suitable for the production of biodiesel. Moreover, it is considered as having great agro industrial potential worldwide, on account of its potential for obtaining high quality oil, and its ease of cultivation (Martin & Mayeux 1984; Azan et al. 2005). Plantings of *J. curcas* have been established around the world, and more recently in various states of Mexico (Michoacán, Chiapas, Puebla, Yucatán, Veracruz, Guerrero, Oaxaca and Morelos) with the principal aim of obtaining biodiesel (Martínez et al. 2010). However, unlike in other countries where this plant is extensively cultivated, in Mexico no studies have been carried out to identify potential insect pests that could affect *J. curcas* production. The aim of this research was to study insects associated with *J. curcas*, and to determine potential pests of this plant in Mexico, where it probably originated.

The study took place between Aug and Nov 2008, in an experimental crop (30 × 20 m²) of *J. curcas* at the fruiting stage, located in the Centro de Desarrollo de Productos Bióticos del Instituto Politécnico Nacional CEPROBI-IPN (18° 49'20" N and 99° 05'38" W at 1105 m asl), with a mean annual temperature of 22.7 °C, warm sub humid climate with summer rains and annual rainfall of 945.7 mm. The experimental crop was enclosed by other crops of *J. curcas*, peanut (*Arachis hypogaea* L.: Fabales: Fabaceae), bean (*Phaseolus vulgaris* L.: Fabales: Fabaceae), maracuya (*Passiflora edulis* Simms; Malpighiales: Passifloraceae) and undergrowth and is skirted by the River Yauatepec.

Direct surveys were conducted using an entomological net made of fine mesh of 30.5 cm diam, once a wk, at 3 different times of day, 7:30 to 9:30 h, 13:00 to 15:00 h and 18:00 to 19:30 h, during the study period. The fruits where the insects were collected during the sampling period were examined for pest damage. The insects collected during sampling were deposited in plastic 50 mL flasks containing 25 mL of 70% alcohol. These flasks were labeled with place, date and time of collection and were deposited for taxonomic identification in the Laboratorio de Entomología del

Instituto de Investigaciones Agrícolas Forestales (IIAF) of the Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, Mexico.

Of the 14 insect species belonging to 18 families and 8 orders (Table 1) identified in this study, two species of true bugs stand out; *Leptoglossus zonatus* (Dallas) (Heteroptera: Coreidae) and *Pachycoris klugii* Burmeister (Heteroptera: Scutelleridae). The species were determined by the keys of McPherson et al. (1990), Borrer et al. (1989) and Peredo (2002). *L. zonatus* was observed feeding directly on tender fruits. This resulted in the development of necrotic spots and consequently fruit abscission by the plant. Generally, this species of true bug was observed in groups and even more frequently copulating pairs were seen on the fruits or leaves. They were collected continuously and in large numbers, i.e., between 3-5 insects per plant and exceptionally 40 adults per fruiting inflorescence. Given the number of this species on the fruits, it is considered to be a pest. It should be noted that in crops such as sorghum, the action threshold against *L. zonatus* is just one bug per panicle (Pineda 1999). *P. klugii* was observed ovipositing on the underside of the leaves. This true bug was less prevalent than *L. zonatus*, and was found sporadically. In contrast to the results found in the present study, *P. klugii* is considered the main pest affecting *J. curcas* in Nicaragua due to its abundance and resulting damage (Grimm 1996; Grimm & Maes 1997; Grimm & Somarriba 1998).

These 2 species have previously been recorded in Mexico, i.e., *L. zonatus* feeding mainly on corn and sorghum (Zucchi et al. 1993), and *P. klugii* feeding naturally on its native host plant known as "chaya de monte" or "mala mujer", *Cnidoscoulus multilobus* (Pax) I. M. Johnston (Malpighiales: Euphorbiaceae) (Peredo 2002). However, they have not been recorded on *J. curcas*. Both these species of true bug have been reported as *J. curcas* pests in countries where it is cultivated. *L. zonatus* and *P. klugii* are considered *J. curcas* pests in Honduras, El Salvador (Alfonso 2008) and Nicaragua (Grimm 1999). *L. zonatus* is distributed throughout the Americas (Allen 1969), and is a polyphagous species with a wide range of hosts (Grimm 1999; Schaefer & Panizzi 2000). Souza & Amaral Filho (1999) mention that

TABLE 1. IDENTIFICATION TO LEVEL OF SPECIES OF INSECTS CAPTURED IN AN EXPERIMENTAL CULTIVATION OF *JATROPHA CURCAS*, LOCATED IN SAN ISIDRO, YAUTEPEC, MORELOS, MEXICO.

Order	Family	Subfamily	Genus	Species	
Coleoptera	Curculionidae		<i>Ephiceus</i>	<i>carneatus</i>	
			<i>Geraeus</i>	<i>senilis</i>	
	Chrysomelidae	Galerucinae		<i>Diabrotica</i>	<i>balteata</i>
			Cassidinae	<i>Chelymorpha</i>	
		Chrysomelinae		<i>Acalymma</i>	
				<i>Leptinotarsa</i>	<i>dececlineata</i>
		Chrysomelinae		<i>Xegecephaleus</i>	
			Alticinae	<i>Crysoamelidae</i>	<i>actisene</i>
	Coccinellidae		<i>Chaetocnema</i>		
			<i>Colaspis</i>		
		<i>Epilachna</i>	<i>varivestis</i>		
		<i>Hippodamia</i>	sp.		
Heteroptera	Pentatomidae		<i>Hippodamia</i>	<i>convergens</i>	
			<i>Epilachna</i>	<i>oscuirela</i>	
	Nabidae		<i>Nezara</i>	<i>viridula</i>	
			<i>Nabis</i>	sp.	
	Miridae		<i>Lygus</i>	sp.	
			<i>Leptoglossus</i>	<i>zonatus</i>	
	Coreidae		<i>Pachycoris</i>	<i>klugii</i>	
		Scutelleridae			
	Homoptera	Reduviidae		<i>Sinea</i>	
		Aphidae		<i>Myzus</i>	<i>persicae</i>
Hymenoptera	Formicidae	Myrmicinae	<i>atta</i> sp.		
	Apidae	Apinae	<i>Apis</i>	<i>mellifera</i> 1	
	Vespidae	Vespinae	<i>Vespula</i>		
Diptera	Tachinidae		<i>Boria</i>		
	Sirphidae		<i>Siricidae</i>		
Neuroptera	Chrysopidae		<i>Chrysoperla</i>	<i>carnea</i>	
Dermaptera	Forficulidae		<i>Dorus</i>	sp.	
Orthoptera	Tettigonidae	Phaneropterinae	<i>Microcentrum</i>	sp.	

this true bug feeds on different species of plants belonging to 14 families, including economically important crops such as corn, sorghum, cotton, tomato, avocado, soya beans, lima bean, guava, pomegranate, melon, cashew nut, pitaya, passion fruit, date, cashew apple, peach, watermelon, Satsuma tangerine and oranges (Essig 1926; Quayle 1938; Panizzi 1989; Kubo & Batista Filho 1992; Zucchi et al. 1993; Matrangolo & Waquil 1994; Jackson et al. 1995; Raga et al. 1995; Grimm & Maes 1997; Mitchell 2000; Schaefer & Panizzi 2000; Souza Filho & Costa 2003; Henne et al. 2003). It also feeds on some ornamental plants such as the African Tulip, *Spathodea campanulata* Beauv. (Souza & Amaral Filho 1999), Desert Willow, *Chilopsis linearis* (Cav.) Sweet (Jones 1993) both in Lamiales: Bignoniaceae, and the Chinese tallow tree, *Triadica sebiferum* (L.) (Euphorbiaceae) (Henne et al. 2003). In contrast, *P. klugii* has only been reported on *J. curcas* and on its native host, *C. multilobus*, both belonging to the Euphorbiaceae, and is thus considered a specialist insect. This species has managed to sequester phorbol esters from *J. curcas* and assimilate them internally to use as a chemical defense against predators (Wink et al. 2000).

The identification in this study of 2 species of true bug reported as pests in other countries

highlights their potential as *J. curcas* pests, in proportion to the commercial expansion of this crop, if necessary precautionary measures are not taken. It is essential that studies on risk analysis and biological control of this pest are carried out. Currently, there are no studies that seek to quantify the damage these insects could inflict on *J. curcas* in Mexico, and such studies are very scarce in other countries (Grimm 1999; Shanker & Dhyan 2006). Nevertheless it appears that the damage caused by these insects would have a negative impact on biodiesel production. A study is needed to identify potential insect pests of *J. curcas*, which is of increasing agro industrial interest. The proposed study should aim at developing and implementing appropriate crop management practices, such as use of improved varieties resistant to pests and diseases in addition to biological control through the use of natural enemies (Grimm & Guharay 1998; Souza & Amaral Filho 1999; Marchiori 2002).

SUMMARY

Two species of true bugs, *Leptoglossus zonatus* (Dallas) (Heteroptera: Coreidae) and *Pachycoris klugii* Burmeister (Heteroptera: Scutelleridae)

are registered for the first time feeding on fruits of the physic nut, *Jatropha curcas*, in Mexico.

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